

## ***Interactive comment on “Interrelationships among soil nitrogen transformation rates, functional gene abundance and soil properties in a tropical forest with exogenous N inputs” by Yanxia Nie et al.***

**Anonymous Referee #1**

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This paper examined the effect of N addition on soil N transformation processes. The information is valuable to our understanding of how increasing N deposition could change soil microbes and the N process they drive. However, I believe the paper should be significantly revised before publication. First, the difference between net N process and gross N process should be carefully discussed. Second, the discussion section is still the re-statement of the findings, but the underlying mechanisms of the findings were not analyzed enough. Especially, if there are inconsistent results currently in different studies, it is better to explain why the difference was observed. If this study only presents the difference, it only increases the uncertainty of current findings, but could not contribute to improve our understanding of the current findings. Please

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see the specific comments:

P2L9-10: This sentence is not clear. Rm and Rn could be driven by soil microbes, but what do you mean by saying they were driven by higher microbial biomass? you mean positive relationship between Rm and MBC? P2L13: Rm and Rn are only net N transformation rates, I don't think they are equal to soil N availability. Inorganic N content is a better proxy of soil N availability. P2L18: significantly P2L20: what do you mean by saying a rate is "delayed"? P3L15-30: this paragraph listed out some papers with different results. However, it is better to summarize these results and analyze why these results were different. For example, there are more similar studies available, why did the authors choose to mention these single papers? Did they all examined net N transformation rate? P4L15-24: Yes, gross N transformation rate is controlled by environmental factors and microbial properties. However, net N transformation rate is the results of changes in both input and output. If the gross N production rate is increased, or the N consumption rate is reduced, both could cause the increase of a net N rate. Therefore, it is better to differentiate gross N transformation and net N transformation in the introduction section. P4L25-L30: Again, N availability is about N pool size, while N transformation is about N dynamic. They are not the same thing. P6L15: More information on N<sub>2</sub>O emission is needed. How many times were N<sub>2</sub>O emission measured in each month? How was annual rate calculated? P6L27: was a dividing factor used to calculate MBC and MBN? P6: It should be clarified that N inorganic N was added into the PVC tubes when N addition treatment was carried out. P7L8: repeated measures ANOVA should be used. P7L14: Is the premise of the PLS-PM method satisfied? P10L5: Again, the difference between gross rate and net rate should be discussed. The promotion of net N mineralization was due to the promotion of gross N mineralization? or due to the reduction in immobilization? or other Loss fluxes? P11L10: NH<sub>3</sub> should be NH<sub>4</sub><sup>+</sup>? P11L14: I wonder if the authors could dig more on the reasons of different findings rather than just saying the difference was due to different systems. If this study cannot contribute to our understanding of the reasons of current different findings, this study can only increase the uncertainty of our

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understand on N cycling. P11L23-24: what is the climate of the Masson forest in Li et al. 2019? Because nosZ is mainly affected by soil moisture conditions, it is important to know the climate information. P12L1-5: The authors only stated the results again, but did not discuss why the controlling factors were different between the two seasons. I imagine soil C:N would not change seasonally due to the large pool size. Why wasn't it a controlling factor in the wet season? P12L20-35: I think some of the discussions here should be mentioned earlier and this section should be re-organized to be more logical. For example, the difference between gross and net rate; the effect of NosZ on N<sub>2</sub>O, the effect of moisture (wet season) on NosZ and N<sub>2</sub>O. These information are important factors for understanding the underlying mechanisms of the findings and should be carefully analyzed when the findings were discussed. P13L5-10: For net N mineralization, it could be possible that both gross N mineralization and immobilization were suppressed, while net N mineralization did not change much. Then it does not mean the negative effects of N addition on soil microbes did not affect N transformation.

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